

# A new subspecies of *Stylidium armeria* (Stylidiaceae) from the Macedon Range, Victoria

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## Abstract

A new subspecies of *Stylidium armeria* (Labill.) Labill., apparently confined to dry heathy vegetation on skeletal shaly soils in the southern foothills of the Macedon Range near Riddells Creek and the Pyrete Range, is described as *S. armeria* subsp. *pilosifolium* R.J.Best, D.E.Francis & N.G.Walsh. It is illustrated and its ecology and conservation status are discussed. A revised key to the members of the *S. graminifolium* Sw. complex in Victoria is provided. The new subspecies is remarkable for the indumentum of copious glandular and eglandular multicellular hairs and short unicellular papillae on the leaf lamina, and its generally smaller morphology.

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## Introduction

In the course of recent surveys of the southern foothills of the Macedon Range (Best & Francis 2008), a few populations of a previously unknown member of the *Stylidium graminifolium* complex (*sensu* Raulings & Ladiges 2001) of uniform anatomy and similar habitat were discovered. Consultation with recent published treatments (Raulings 1999; Jackson & Wiltshire 2001; Raulings & Ladiges 2001) and with specimens at the National Herbarium of Victoria (MEL) has led to the conclusion that these populations represent a new, previously uncollected, entity related to *Stylidium armeria*. The opportunity is taken here to describe this new subspecies.

## Taxonomy

***Stylidium armeria* subsp. *pilosifolium* R.J.Best, D.E. Francis & N.G. Walsh, subsp. nov.**

*A subspecies armeria* (Labill.) Labill. foliis brevioribus pilosis in paginis ambabus differt

**Type:** Victoria. Riddells Ck, Barrm Birrm, between Princess St and Prince Alfred St, 14.xi.2007, D.E. Francis 4 (holotype: MEL 2323797; isotypes: CANB, HO, PERTH).

*Perennial* herb 15–40 cm high, often shortly rhizomatous. *Plants* solitary or in clumps usually of 2–5 tufts. *Leaves* all basal, erect to spreading, oblanceolate, typically 5–11 cm long, 4–8 mm wide (rarely smaller), both surfaces and margins pilose, especially margins and midrib on undersurface, pale green; hairs multicellular, to c. 1 mm long, with cells in 2 columns below the glandular or eglandular tips, unicellular papillae abundant on the adaxial surface and abaxial midrib, absent or very sparse elsewhere on the abaxial surface; margins entire; apex acute. Stomata adaxially confined to narrow (0.1–0.2 mm wide) bands bordering the midrib, or sometimes apparently absent, abaxially evenly

distributed between the midrib and margin. *Scape* 10–25 cm high, less than 2 mm diameter, moderately to densely glandular-pubescent; *inflorescence* a simple, erect raceme 5–15 cm long; *flowers* 5–30 per raceme. *Calyx* narrowly ovoid-cylindrical, 2–3.5 mm long, glandular-pubescent, 2-lipped, each lip  $\pm$ obcordate and comprising 2 largely fused lobes, free for only c. 0.5 mm; *corolla* 8–10 (–12) mm across, white or pale pink, abaxially lightly glandular-pubescent, lobes paired laterally, obovate, not equal, the posterior lobes longer and wider than anterior pair; *labellum* broadly ovate, 2–3 mm long, obtuse to acute, paired lateral appendages filiform, c. 1 mm long; *throat appendages* 8, the 6 anterior appendages prominent,  $\pm$ equal, 1–2 mm long, densely papillate with white, yellow or red papillae, the 2 posterior throat appendages each reduced to a papillate or colliculate mound on the petal; *column* 7–9 mm long, the flexion zone thickened c. 3 mm from base, and the distal part inflexed c. 2 mm below the anther-stigma complex; anthers dark-rimmed, pollen white; stigma orbicular, with short glands. *Capsule* ovoid-globose, 5–8 mm long; seeds

angular-ovoid, c. 1 mm long, crimson to reddish-brown with a small, pale, apical caruncle. Figs 1A, 2.

**Specimens examined:** VICTORIA. Riddells Ck, c. 3.5 km N of town centre, 4.xi.2007 N.G. Walsh 6722 (MEL 2314295).

**Distribution and habitat:** *Stylidium armeria* subsp. *pilosifolium* is apparently endemic to the foothill forests at the south-eastern extreme of the Macedon Range and in the Pyrete Range. It is currently known from only six discrete populations in the Riddells Creek–Barringo area in the Mt Robertson Range, and one population in the nearby Pyrete Range c. 11 km to the south-west. It occurs at altitudes between 450 and 600 m a.s.l. The local average annual rainfall is c. 760 mm. The habitat is generally grassy or heathy woodland in foothill forest largely devoid of medium or large shrubs, and with a sparse ground layer usually with considerable areas of bare soils. Fig. 1B.

Two vegetation types (EVCs sensu DSE 2004) have been identified containing *S. armeria* subsp. *pilosifolium*. (1) Heathy Dry Forest consisting of a low heathy woodland dominated by stunted *Eucalyptus dives* Schauer and *E. cephalocarpa* Blakely over bare shaly ground dominated



**Figure 1A.** *Stylidium armeria* subsp. *pilosifolium* plants *in situ* at Riddells Creek; **1B.** Low heathy woodland at Riddells Creek with stunted *Eucalyptus dives* to c. 5 m high on skeletal, shaly ground.



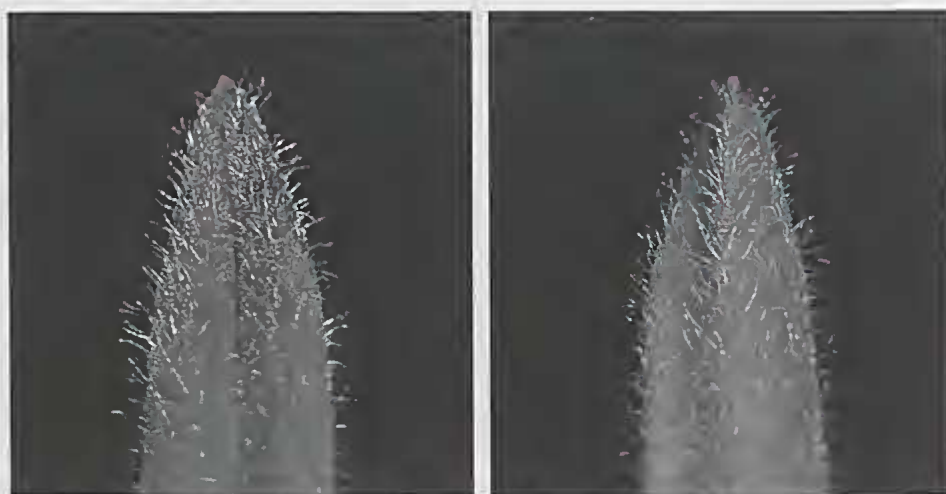


Figure 2. Adaxial (left) and abaxial (right) leaf surfaces of *S. armeria* subsp. *pilosifolium* (from plants cultivated at Royal Botanic Gardens Melbourne).

by *Poa sieberiana* Spreng., heaths (e.g. *Monotoca scoparia* (Sm.) R.Br., *Leucopogon virgatus* (Labill.) R.Br.), other low woody shrubs (e.g. *Cryptandra amara* Sm., *Acacia gunnii* Benth., *Podolobium procumbens* (F.Muell.) Crisp & P.H.Weston, *Dillwynia sericea* A.Cunn.), *Xanthorrhoea australis* R.Br., stunted *Lepidosperma laterale* R.Br. and *Lomandra filiformis* (Thunb.) Britten, and geophytes (e.g. *Glossodia major* R.Br., *Diuris sulphurea* R.Br., *Burchardia umbellata* R.Br.). (2) Grassy Dry Forest on and around dry spurs in foothill forests dominated by a mix of eucalypts (*Eucalyptus obliqua* L'Her., *E. cephalocarpa*, *E. dives* and *E. aromaphloia* L.D.Pryor & J.H.Willis) and an understorey of stunted shrubs (e.g. *Dillwynia sericea*, *Grevillea alpina* Lindl., *Correa reflexa* (Labill.) Vent.), *Xanthorrhoea australis*, a ground layer of perennial graminoids (e.g. *Joycea pallida* (R.Br.) H.P.Linder, *Poa sieberiana*, *Dianella admixta* Gand.) and forbs (e.g. *Brunonia australis* Sm. ex R.Br. and *Coronidium scorpioides* (Labill.) Paul G. Wilson).

The soils are shallow to skeletal yellow duplexes derived from metamorphosed Ordovician sandstones, locally incorporating rounded river stones, providing the regionally distinctive 'conglomerate' rock for which the Conglomerate Gully Reserve in Riddells Creek is named (L. Milne pers. comm.).

**Conservation Status:** More than 90% of the known population of this plant is restricted to an area known as Barrm Birrm, the side of the Mt Robertson Range that overlooks Riddells Creek. This area is not reserved. It is estimated that this area may contain about 500 plants,

mostly along three dry spurs. Only five other occurrences of the plant have been recorded, with just a few dozen plants at each of these locations, namely, three other areas in the Robertson Range – Conglomerate Gully Reserve, managed by Parks Victoria; Barringo Reserve, managed by Macedon Ranges Shire Council; Mt Teneriffe, managed by Trust for Nature; and on private land on Mt Robertson – and one small patch in the Pyrete Range near Gisborne. At each of these sites it is highly restricted with the largest patch about 100 m x 30 m. A local form of *Stylidium armeria* subsp. *armeria* is often found in proximity to (but never truly contiguous with) *S. armeria* subsp. *pilosifolium*. It occurs on slightly deeper soils in the moister valley/depressions between the drier spurs that support the new subspecies. In these areas *S. armeria* subsp. *armeria* has white to pale pink flowers and leaves always less than 20 cm long, features that deviate from the key in Raulings and Ladiges (2001) for *S. armeria* (see 'notes' below). Seedling trials at the Royal Botanic Gardens Melbourne, comprising over 30 plants of both subspecies, grown from seed collected at and near the type locality for *Stylidium armeria* subsp. *pilosifolium*, produced progeny with the same characteristics as the parent plants; i.e. *S. armeria* subsp. *pilosifolium* seedlings produced short, distinctly pilose leaves whereas subsp. *armeria* seedlings had longer, relatively narrower leaves with sparse hairs confined to the margins. Adult plants of subsp. *pilosifolium* retain the short, hairy leaf character whereas subsp. *armeria*

plants soon become glabrous and produce longer leaves. Another, apparently typical, form of *Stylidium armeria* subsp. *armeria* with leaves 20–30 cm long is also found elsewhere in the general vicinity, but separated from the aforementioned populations (e.g. at higher altitudes in Riddells Creek and Mt Macedon). *Stylidium graminifolium* also occurs in the vicinity (e.g. at Riddells Creek Cemetery) on deeper soils supporting remnant grassland dominated by *Themeda triandra* Forssk.

We suggest a conservation status of Critically Endangered (*sensu* IUCN 2001). The major threat is probably destruction of habitat by human activity and residential development. The largest populations are in areas that offer unrestricted public access and are used by off-road vehicles (motorbikes and 4WDs) and horse riders. Being at the bushland-urban interface, rubbish dumping including garden refuse occurs around the largest populations, leading to the likelihood of invasion by horticultural weeds.

**Etymology:** The epithet *pilosifolium* (Latin *pilosus* – pilose; *folium* – leaf) refers to the most obvious characteristic separating this from other members of the *S. graminifolium* complex.

**Notes:** The new subspecies differs from typical *S. armeria* in having generally shorter leaves that are densely pilose on both surfaces, usually more densely so on the margins and on the abaxial midrib. As well as these longer hairs, the adaxial leaf surface and the abaxial midrib bear short, unicellular, eglandular papillae. The latter are rare on typical *S. armeria*. The composition of the overall indumentum is apparently unique in *Stylidium* (J. Wege, PERTH, pers. comm.). It has generally shorter, fewer-flowered inflorescences. The flowers are generally smaller than those of typical subsp. *armeria*. The flowers are also white to pale pink, a feature that differs from the treatment by Raulings and Ladiges (2001) for typical *S. armeria* but which is also a feature of some short-leaved forms of subsp. *armeria* that we have collected nearby in Riddells Creek (MEL 2323796) and in similar dry heathy forest in ranges to the north-east of Melbourne, e.g. near Kinglake (MEL 670177, 2314297) and Toolangi (MEL 2323829). This form has leaves <20 cm long that are glabrous or, rarely, sparsely glandular-pilose on the margins and/or abaxial midrib only. A single plant observed at Riddells Creek in summer 2007 appeared to be intermediate

in character between subsp. *pilosifolium* and the short-leaved form. Seeds were collected from this plant and germinants were grown on at the Royal Botanic Gardens Melbourne nursery. There was clear segregation of the cohort of seedlings into hairy- and glabrous-leaved plants, and these characters were retained to maturity, supporting the notion that the parent plant was a hybrid between the two subspecies. No other apparent hybrids were observed then or since.

The characters used to separate the two subspecies of *S. armeria* here are of comparable taxonomic value to those used to separate other species in the *Stylidium graminifolium* complex as outlined by Raulings and Ladiges (2001). In fact there is considerable overlap of characters in the taxa dealt with by Raulings and Ladiges (*op. cit.*), whereas *S. armeria* subsp. *pilosifolium* is immediately distinguished from the other members of this complex by its hairy mature leaves.

On the basis of this assessment, a case could be made to recognise subsp. *pilosifolium* at species rank but we prefer to make obvious what we believe to be the closer relationship to *S. armeria* than to other members of the complex and recognise it at subspecific rank.

We provide a revised key to the complex as it occurs in Victoria, taking into account the new entity and a reassessment of characters used in previous keys (e.g. Raulings 1999; Raulings & Ladiges 2001; Wiltshire & Jackson 2001) based on our observations of herbarium specimens and living plants *in situ*. We do not recognise *S. dilatatum* W.D.Jacks. & R.J.E.Wiltshire as a member of the Victorian flora and believe specimens previously referred to that species in Victoria belong to the variable *S. armeria* subsp. *armeria*.

## Acknowledgements

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A revised key to the *Stylidium graminifolium* complex:

- 1 Leaf width <3 mm, more or less linear ..... 2
- 1: Leaf width ≥3 mm or, if <3 mm, then leaf narrowly oblanceolate to oblanceolate ..... 3
- 2 Flowers white to pale pink; plants generally not or only weakly rhizomatous; mainly sandy or clay soils from near sea-level to c. 500 m a.s.l. .... *S. graminifolium*
- 2: Flowers deep pink to magenta; plants typically strongly rhizomatous and forming compact clumps of up to c. 50 crowns; restricted to peaty soils of montane to sub-alpine areas ..... *S. montonum*
- 3 Longest leaf (2–)5–40 cm, if longest leaf ≤11 cm then pilose; plants usually solitary (but often rhizomatous with 2–5 crowns in subsp. *pilosifolium*); widespread from the coast to the subalps ..... 4 (*S. armeria*)
- 3: Longest leaf 2–12 cm, glabrous; plants typically strongly rhizomatous and forming compact clumps of up to c. 50 crowns; restricted to moist, peaty soils of sub-alpine and alpine areas ..... *S. montanum*
- 4 Leaf glabrous on both surfaces or, rarely, with a few, widely spaced glandular hairs on margins and/or abaxial midrib, and these usually present only on juvenile plants; longest leaf (10–)12–40 cm long, leaf length/width ratio mostly >18; flowers mostly deep pink to magenta (rarely pale pink or white); widespread in diverse habitats from the coast to the subalps ..... subsp. *armeria*
- 4: Leaf pilose with eglandular and glandular hairs on both surfaces and margins; longest leaf 11 cm long or less, leaf length/width ratio <18; flowers white to pale pink; apparently restricted to dry, shaly soils in foothills at the southern end of the Macedon Range near Riddells Creek and the nearby Pyrete Range ..... subsp. *pilosifolium*

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